REALTIME update

A Newsletter for Noise, Vibration and Electromechanical Test Professionals

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Inside Realtime Update

HEWLETT PACKARD

Improving Automotive Wind Tunnel Tests

by Al Prosuk and Josef Hobelsberger

Every driver knows that a car's appeal goes way beyond facts and figures and specifications. Subjective factors such as style and ride can play an important—and sometimes dominant—role in the purchase process. As global competition in the auto industry heats up, interior sound quality has become one of those critical subjective factors.

Photo courtesy Ford Motor Co.

The measurement, characterization and modification of sound and its perception are all part of psychoacoustic or sound quality engineering. The accurate measurement of parameters such as loudness, sharpness and roughness helps predict how passengers will respond to vehicle cabin sounds.

A moving vehicle on a test track provides a challenging environment for measuring wind noise. Other noise sources mix in on the track, and engineers have little or no control over these environmental factors. To provide controlled wind conditions, most automotive companies take advantage of low-speed wind tunnels.

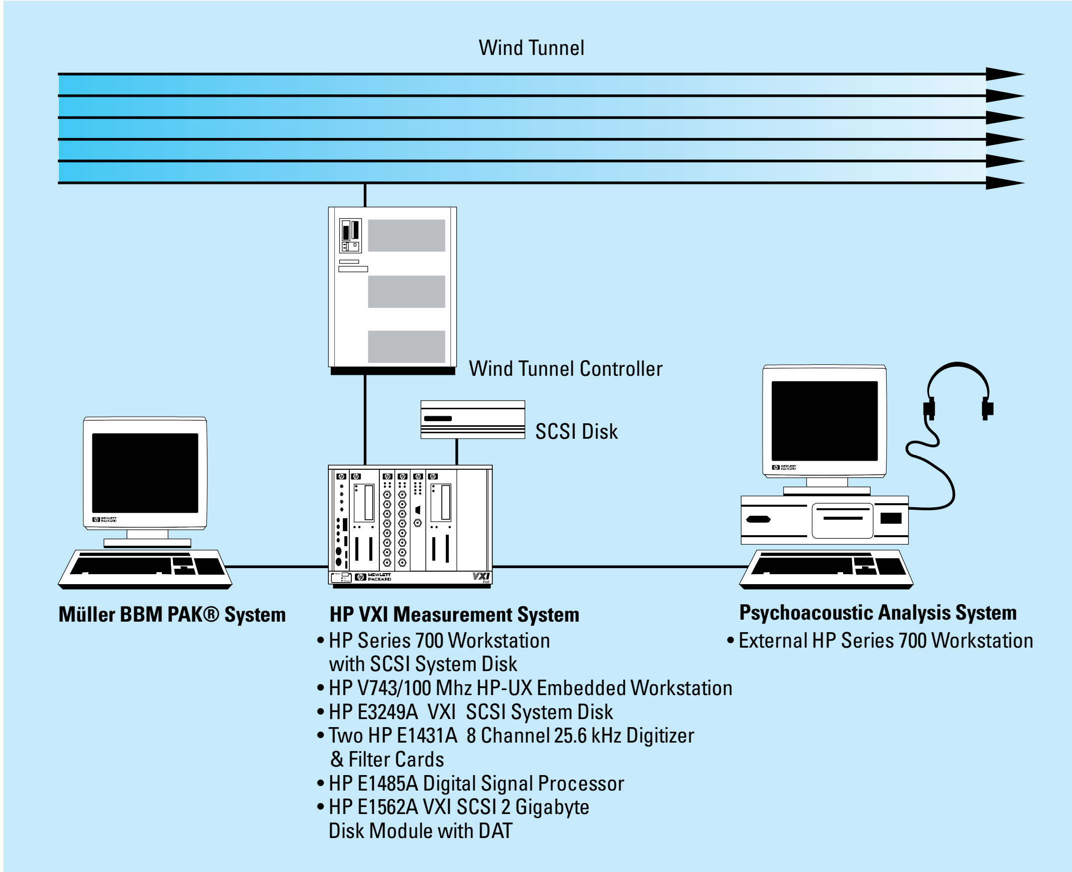

Figure 1: Using the PAK system for wind tunnel testing

Traditional wind-tunnel measurements

To measure interior noise, engineers typically equip the test vehicle with binaural heads (dummies with microphones for ears) in representative passenger positions. In a traditional wind tunnel test, each binaural head is connected to a separate two-channel 20 kHz DAT recorder. Simulating four passengers thus requires four separate DAT recorders.

With a vehicle in the tunnel, test engineers make recordings at various wind speeds and vehicle orientations. The test data include the DAT recordings, the test set-up and the wind tunnel operating conditions. After the tests are completed, engineers return all the data to the lab for analysis. Any modifications to the test vehicle are specified, implemented and tested after analysis.

Unfortunately, this traditional technique has some drawbacks, many related to the fact that wind tunnel test time is very expensive:

- Test times must be scheduled many weeks or months in advance, and test engineers are under pressure to get the maximum amount of information in as little time as possible.
- Engineers usually cannot monitor the data during the test, so circumstances requiring retests may not become apparent until long after the test is finished.
- Traditional data collection systems typically have very limited playback capabilities.
- Multiple independent recordings make it difficult to correlate the relationships between the various input channels.
- Traditional data collection systems usually have very limited analysis capability, which makes it difficult to modify experiments on the spot to make more effective use of the tunnel test time.

A better approach for more efficient testing

Ford Motor Company is just one of the major manufacturers to optimize test efficiency with the Müller BBM PAK psychoacoustics test system. This system uses HP VXI hardware with Müller BBM software to provide highly accurate measurement, recording, analysis, acoustic modeling and process documentation (see Figure 1).

The VXI measurement system with its embedded workstation is the measurement hub. The embedded workstation connects to the wind tunnel computer system and to an external workstation running the psychoacoustics software. An external SCSI Data Disk connected to the VXI system provides real-time storage. Wind tunnel parameters and test conditions pass from the tunnel control computers to the VXI workstation, and the external workstation then calculates psychoacoustic parameters while the next test is running in the tunnel.

Measurement overview

Ford engineers enter setup information through a customized user interface on the VXI portion of the PAK system. Operators start the tunnel systems, and testing begins when the desired test conditions are reached. The VXI workstation gathers and stores the wind tunnel parameters as part of the test files. When the test is under way, the eight-channel HP E1431A input modules are on-line, digitizing acoustic time domain data. These data are streamed to the HP E1562A Data Disk using the HP high speed local bus. As data are digitally recorded, they are simultaneously processed by the HP E1485A DSP module. With this multiprocessing approach, the test engineers can monitor time domain, frequency domain and even octave band results (one-third and full octave) while the test is under way.

When the test is complete, the system transfers the test conditions, raw data and the first set of processed results to the external SCSI disk. The measurement system is then immediately ready for the next test run. Engineers can use the external workstation to compute psychoacoustic parameters and to conduct modeling on one test while another acquisition is under way. With both embedded and external controllers available, the PAK system and HP VXI greatly increase the amount of data reduction that can be done on site.

Measurement performance

The Müller BBM PAK system shortens and simplifies the test and analysis process in several important ways, including gathering test conditions such as vehicle position, wind speed, temperature and pressure. This information is automatically linked to the test files that contain the actual measured data from the test vehicle.

The HP VXI hardware can record a large number of channels simultaneously at full audio bandwidth with no gaps in the data. One disk can record up to 25 channels, and HP VXI supports multiple disks for even longer captures and higher throughput. (The Müller BBM PAK system is scaleable and can support up to 256 input channels.)

While the test is under way, test engineers can listen in to selected measurement points as well as monitor the values using time or frequency analysis. This provides an extra measure of test feedback for on-site staff.

Figure 2: The new PAK-Mobil system provides psychoacoustic capabilities in a portable package.

Analysis capability

The ability to process test data into meaningful results on site is a key strength. PAK computes a number of psychoacoustic quantities online, including

- *Instationary loudness*, the perceived magnitude of noise volume (expressed in *sones*)
- *Sharpness*, the proportion of loudness in critical frequency bands (expressed in *acum*)
- *Fluctuation strength*, the variation of dynamic noise (expressed in *vacil*)
- *Roughness*, the temporal loudness deviation from 20-300 Hz (expressed in *asper*)

Computational results give the test engineers on site nearly immediate feedback on how the product is performing under test conditions. The test system also includes an Audio Editor tool that lets the test engineer experiment with modifications to the sounds being measured. The Audio Editor makes it possible to both display and listen to the vehicle wind noise mixed with recorded road noise to simulate real-life conditions. Test engineers can also quickly model sounds with selected frequency bands filtered out. This helps eliminate offending tones by demonstrating how the test vehicle will sound after modification. The engineer can then decide whether a quick design modification, on site, is worth exploring.

The bottom line of psychoacoustics is making products more competitive in the global marketplace. The example here is from the automobile market, but the same concerns apply to office products, community noise, aircraft and consumer appliances, to name just a few. ■

For more information on Müller PAK Psychoacoustics, contact:

North and South America:
Al Prosuk
m + p international
(201) - 239 - 3005

All other locations:
Josef Hobelsberger
Müller BBM
tel: 49-89-856020-0

Measuring to Meet Acoustic Emission Requirements

By Charles T. Moritz, Arno S. Bommer and Robert D. Bruce

The next time a noisy colleague interrupts you, imagine what it must be like working next to a gas turbine or some other high-intensity noise source. Noise generated by industrial machinery can affect not only the people who work in the immediate vicinity, but also people in surrounding rooms, buildings and neighborhoods. Because excessive noise can be annoying and even harmful (Figure 1), a variety of government regulations specify allowable noise levels both inside and outside workplaces.

Measuring noise levels at a specific location is relatively simple, but determining and fixing the cause of excess noise is not always easy. A typical building has many sources of industrial noise, making it difficult to isolate, measure, and then reduce the noise generated by each piece of equipment. A specialized measurement technique, *sound intensity*, helps test engineers identify the noise generated by an individual machine.

Our firm, Collaboration in Science and Technology Inc. (CSTI), has used sound intensity measurements to determine the level of noise caused by a wide range of machines. Before we look at some example measurements on gas turbines, here's a brief review of some basic sound measurement units and terminology.

- *Sound pressure level (L_P)* is a measure of the amplitude of a sound wave at a specific point. This is a scalar quantity, meaning it contains no information about where the noise is coming from. Sound pressure is a measure of the total noise at a point. Most noise regulations limit sound pressure because this is the parameter that human ears receive.

- *Sound intensity level (L_i)* is a measure of the amplitude and direction of a sound wave. This is a vector quantity and because it includes direction, sound intensity includes information about where the noise is coming from. For example, if the L_p of a sound is 90 dB and all of the sound is traveling directly at the sound intensity probe, the L_i is also 90 dB. If the sound wave is traveling directly away from the probe (180° from the previous example), the L_i is -90 dB. If the sound is traveling perpendicular to the probe (90° or 270°), the L_i is 0 dB.

- *Sound power level (L_w)* is a measure of the total sound power produced by a noise source. The sound power level depends on the sound intensity level and the size of the sound source. It is useful for predicting sound pressure levels at long distances from the source. For instance, a gas turbine in a large enclosure and a small electric motor may generate the same L_i at a distance of three feet but not at 400 feet.

- *A-weighted filters* attenuate low-frequency sounds and slightly accentuate high-frequency sounds, simulating how the human ear hears many sounds. Many noise regulations are stated in terms of A-weighted values.

- *Dynamic insertion loss (DIL)*is the normal measure of acoustical performance for silencers. DIL is the measure of the difference between the transmitted sound power level at a set location with and without the silencer.

- *Transmission loss (TL)* is the measure of acoustical performance for walls or panels. TL is the difference between the sound power incident on one side of the panel and the sound power radiated from the other side of the panel.

- *Sound absorption coefficient (α)* is the measure of acoustical performance for sound absorptive surfaces, ranging from 0 to 1. A completely reflective surface has an α of 0; a completely absorptive surface has an α of 1.

All of these variables are normally measured in octave bands of frequency because the performance of equipment, silencers, and materials vary significantly at different frequencies.

Figure 1: Examples of A-weighted sound levels
This comparison of typical sound levels in a congeneration plant highlights the need for effective sound analysis and control.

(dBA)	Cogen Equipment	Other Sounds
140	Unsilenced Turbine Inlet at 3 ft.	
130	Unsilenced Turbine Exhaust at 3 ft.	
120		Rock Concert
	Inside Turbine Enclosure	
110		
100		
	Inside Powerhouse Building	
90		Noisy City Street
80	Lube Oil Cooler at 3 ft.	
70		
	Inside Control Room	
60		Conversational Speech
50		Average Office
40		
30		Library
20		
10		
0		Threshold of Audibility

Measuring sound intensity

Because sound intensity is a vector, it is a good tool for distinguishing one sound source from another. For example, sound intensity is useful for isolating the noise created by a turbine in a room with some sound reflections and other noise sources.

Sound intensity is expressed mathematically as $I = p \bullet v$, where p is the sound pressure and v is the velocity along the intensity probe's axis. The velocity is difficult to measure directly, so you must often approximate it as the sound pressure gradient between two microphones. The equation becomes

$$I = -\frac{P_2 + P_1}{2\rho_0 \Delta r} \int_0^t (P_2 - P_1)\,dt$$

where P_1 and P_2 are the pressure levels at each microphone, ρ_0 is the air density, Δr is the spacing between the two microphones, and t is the integration time. The spacing of the microphones is critical. Use 50 mm for low frequencies and 6 mm for high frequencies. In order to measure the normal audible spectrum (Figure 2), you must make two measurements, one with 50 mm spacing and one with 6 mm spacing.

To determine the sound power level of a sound source, you measure the sound intensity level over an imaginary surface containing the sound source (Figure 3) and add a correction for the surface area of the imaginary container. All sound originating inside the container has a positive sound intensity. The sounds from outside the container subtract from the intensity when they enter the container and add to intensity when they exit the container. The average of intensities over the total surface area is thus the intensity from the sound source contained by the surface. For an accurate measurement, the levels of both the sound source and sound outside the container must be steady during the measurement, and any outside sounds must pass through the imaginary container without being absorbed.

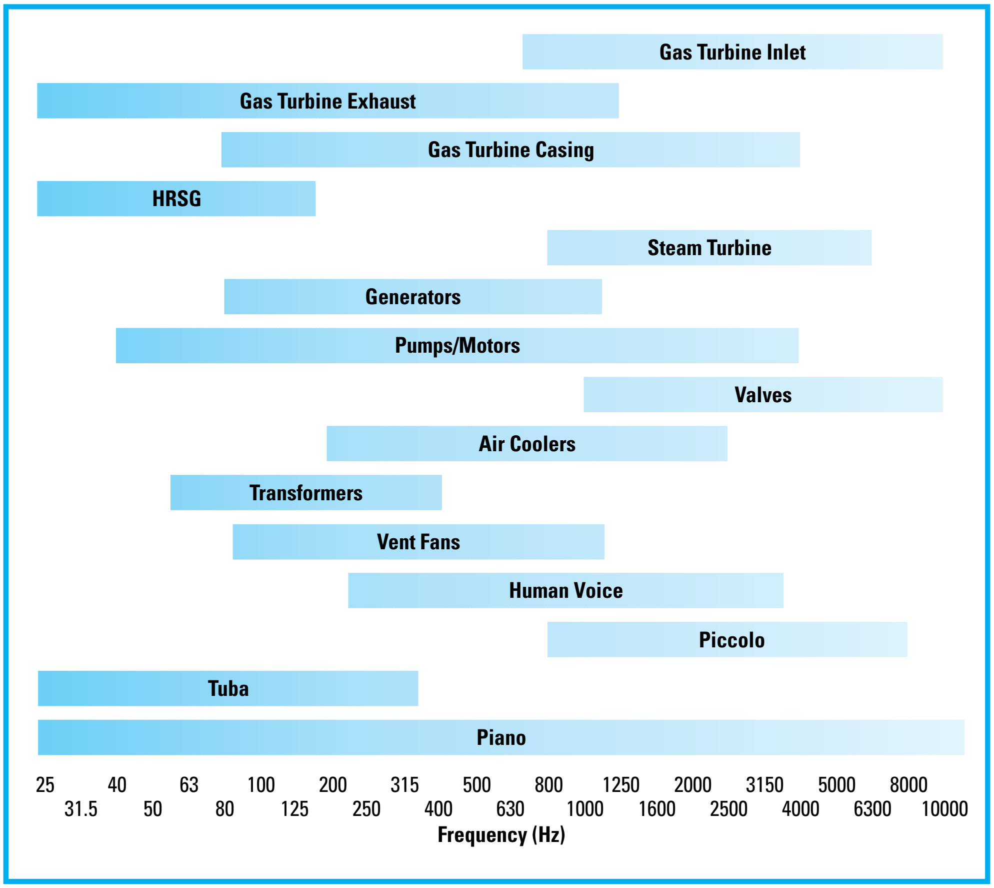

Figure 2: Examples of noise spectra
Gas Turbine cogeneration packages, like much industrial machinery, can generate noise over the entire audible frequency range

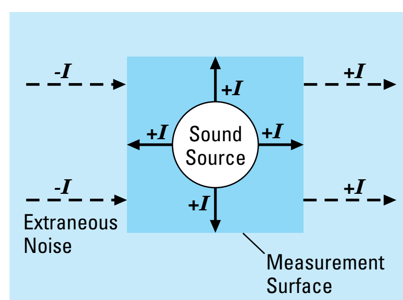

Figure 3: Sound intensity measurement surface
Sound intensity is measured over an imaginary surface enclosing the sound source.

Measuring noise contribution from individual package components

Acoustical specifications for gas turbine packages are often written as not-to-exceed limits of the A-weighted sound pressure level at a specified distance. This distance may be three feet from the enclosure for OSHA requirements or several hundred feet for community requirements.

If a gas turbine package exceeds specified acoustical levels, you must determine which package component is causing the excess noise. You can isolate and operate some components independently, but other components are harder to measure individually. Here are some examples of techniques we've used to help manufacturers isolate the causes of excessive noise.

Ventilation Fans
Many manufacturers test ventilation fans in a reverberation chamber and calculate sound power level in the 63 Hz to 8 kHz octave bands. Manufacturers frequently guarantee sound power levels rather than sound pressure levels. To determine compliance in the field, you must determine the sound power level of the fan, separate from the motor, duct breakout, and any noise from the turbine enclosure passing through the fan. By measuring the sound intensity of the fan discharge, duct casing, and fan motor with and without the turbine operating, you can separate the noise from the ventilation fan, the fan motor, the fan and duct casing, and the turbine casing.

Silencers
You can determine the DIL of a turbine exhaust silencer by measuring the sound power of the silenced and unsilenced exhaust. Often you can measure sound pressure of the unsilenced exhaust. However, the noise from other sources can contribute significantly to the total noise at the silenced exhaust, so you may need to measure sound intensity to accurately determine the silenced exhaust levels.

Enclosures
For a gas turbine package, the acoustical performance of the enclosure often determines the minimum achievable sound power level for the entire package. Although you can test the enclosure panels and doors separately in a lab, the field performance is often affected by the seals around the doors and panels, especially with positive-pressure enclosures. When the doors and panels seal tightly, the enclosure's acoustic performance can be limited by the structure-borne sound reradiated by the panels and skid structure. By measuring sound intensity, you can determine the sound power levels of the enclosure and skid and then determine the limiting factors in the acoustical performance.

One way to test enclosures is to use loudspeakers inside the enclosure. By measuring the sound power radiated by the speakers and the sound power radiated from the various components of the enclosure and structure, you can measure the field TL of the panels, the differences in the acoustic performance of different seals, and the radiation efficiency of the panels and structure.

In general it is very expensive to retrofit a poor enclosure.

Gas Turbine Exhaust
Noise levels in the lower frequencies (<250 Hz) often dominate the sound power level of both the unsilenced and silenced gas turbine exhaust. Because of the temperature and high flow velocities of the exhaust, you cannot usually make sound measurements directly in the exhaust stream. However, measurements at locations known as EN1 positions (1 diameter out and 1 diameter up from the center of the exhaust) at different directions around the exhaust duct opening can provide useful engineering data. Measuring sound intensity helps to reduce the effect of contributions from other component noise sources.

Gas Turbine Inlet
An unsilenced inlet opening is normally loud enough to allow measuring either sound pressure or intensity, but you must use intensity to measure the silenced inlet opening because it is normally quieter than other noise sources in the area. In many cases the noise from the inlet is dominated by high-frequency blade-passage tones from the compressor section of the turbine. Accurately measuring sound intensity at these frequencies requires a pair of 1/4" microphones spaced 6 to 12 mm.

Duct Breakout Noise from Inlet and Exhaust
Depending on the locations of the silencers for the gas turbine inlet and exhaust, duct breakout noise may be an important sound source. Measuring sound intensity is the best way to document the noise contribution radiated from the ductwalls.

Gas Turbine Casing
The sound power radiated from the casing of the gas turbine is the most difficult component to measure in the field. Units are almost always packaged with a tight-fitting enclosure, and it is difficult to create an accessible imaginary measurement box around the turbine casing but inside the enclosure. Sometimes the doors and side panels can be removed from the enclosure frame, but usually the roof and end walls cannot be removed. In addition, high sound levels from untreated inlet and exhaust ducting can significantly reduce the accuracy of the measurements. For an unenclosed turbine, an imaginary measurement box can be created. In this case, however, other sound sources can dominate the sound field.

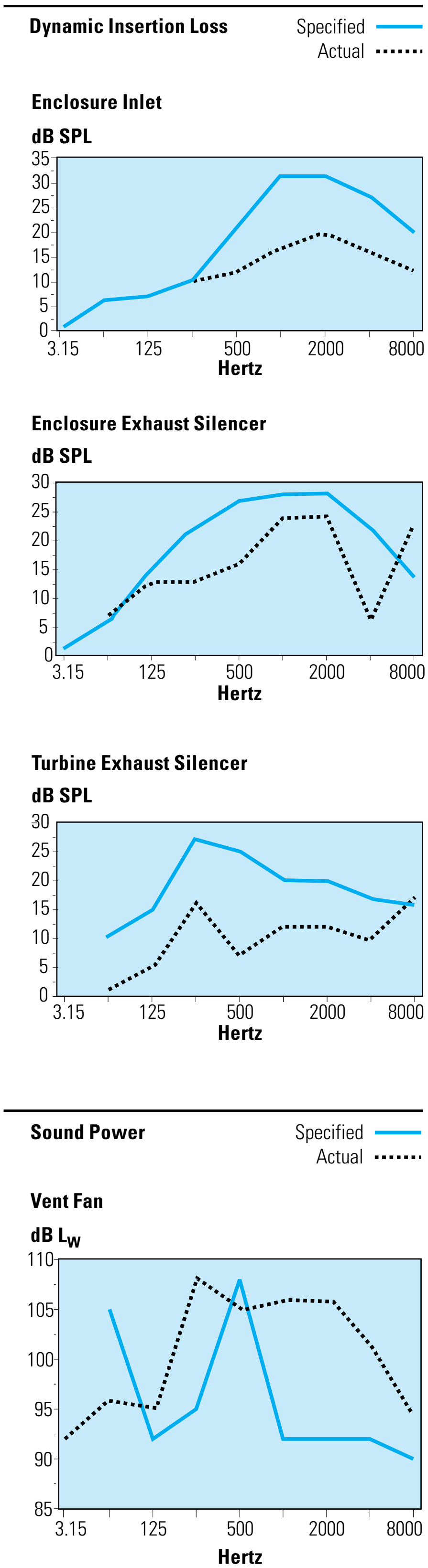

Figure 4: Comparing guaranteed and actual sound levels
In this particular case, our measurements of dynamic insertion loss and sound power showed that the equipment did not meet all the manufacturer's guaranteed levels.

Here's a real-life example

One of CSTI's recent field measurements involved a simple-cycle gas turbine package. The noise specification was 82 dBA at three feet from the unit with all equipment operating. The package included a starter unit, lube oil cooler, enclosed gas turbine, enclosed generator, combustion air inlet filter and silencer, turbine exhaust silencer, and enclosure ventilation fans and silencers. The unit was new, and the expected sound levels from the turbine exhaust, casing, and inlet were not specified. When we first brought the unit on-line in the test area, the sound level was 94 to 105 dBA at 3 ft from the unit.

Our first task was to determine the sound power levels from each of the components so that we could determine compliance with component specifications and develop appropriate noise control. We could operate some of the components (such as fans) independently and measure the sound pressure at a predetermined position. Other components had to be measured with the full turbine in operation. We used sound intensity to determine sound power levels for a number of sources. The sound power level data were then used to develop noise control treatments to bring the sound level of the unit down to 82 dBA. Using sound intensity gave us the ability to separate the power levels of many of the components, and it also allowed us to show that the original turbine exhaust silencer, enclosure ventilation inlet silencer, and the enclosure ventilation fans did not meet the manufacturer's guaranteed DIL or sound power levels (Figure 4).

The silencer manufacturer provided different silencers, but the fans could not be changed. At three feet from the enclosure, there were very strong tones at the same frequency as the turbine intake. Using sound intensity measurements, we discovered that this noise was radiating from the intake duct, not the intake opening. Duct lagging treatments were then designed to reduce this noise.

In some cases, accurate sound intensity measurements are impossible because an imaginary surface can't contain the sound source or the signal-to-noise ratio is too low. For example, the DIL for the enclosure ventilation exhaust silencer showed a dip in the 4 kHz octave band. The dip is due to the influence of very strong tones radiated from nearby combustion inlet air ducting, resulting in a low signal-to-noise ratio in this octave band. The measurements showed that the DIL of the silencer is only 6 dB, but the figure is probably around 20 dB in the 4 kHz octave band. The sound intensity measurement standards include such checks to ensure accurate measurements.

This is just one example of how sound intensity has proved to be an invaluable tool for diagnosing noise problems, determining individual component compliance and developing cost-effective noise control treatments. Using this technique in the field, we have helped a wide variety of owners, operators, architects/engineers and packagers meet both near-field and far-field noise specifications. ■

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Realtime Basics: Order Analysis

Analyzing the health and behavior of rotating machinery is a key application for dynamic signal analyzers (DSAs). Rotating machines produce repetitive vibrations and acoustic signals related to rotational speed. These relationships are not always obvious with standard dynamic signal analysis, particularly with variations in the rotational speed. A measurement technique called order analysis is the secret to sorting out all the many signal components that a rotating machine can generate.

Synchronizing the measurement

With flexible settings for frequency span and resolution, a typical DSA can do a great job of isolating noise and vibration components, as long as the machine is operating at a fixed speed. As the speed changes, however, the signals of interest shift up or down in frequency, making analysis difficult if not impossible. Synchronizing the DSA's data collection with the machine's rotational speed is therefore a key step in order analysis.

Synchronization usually starts with a tachometer, which provides a pulse or an integral number of pulses for each revolution. This signal indicates that the machine has finished one cycle and is beginning the next. A single tach pulse indicates when the rotating machine has reached a particular angular position. After capturing two tach pulses, you can determine rotating speed by counting clock cycles between the tach pulses. A third pulse will then tell you if the machine is changing speed. Using the tach pulse to trigger the DSA synchronizes the machine and the measurement.

DSAs use an analog-to-digital converter to collect a block of data. In regular spectrum analysis, this block of data consists of voltage values spaced at regular time intervals. When you start gathering a block of such points, you also determine the finish time. This is one of the difficulties with order analysis. If the machine is changing speed, how do you fill the block just as you get the next tachometer pulse? Three techniques are commonly used.

- Shaft encoders are electro-optical devices that generate thousands of digital pulses per revolution, gating time samples into the data block.
- A ratio synthesizer and tracking filter emulates a shaft encoder with alias protection.
- With the digital resampling technique, the DSA digitizes data at a very high rate, collecting and storing tightly spaced time samples. As tach pulses arrive, the analyzer resamples the time points into correctly spaced data.

With each of these three techniques the goal is a set of points evenly spaced by shaft position, not by time (Figure 1). This yields data in the revolution domain, rather than in the time domain. Again, the key benefit here is that the measurement rate tracks the rotational speed of the machine.

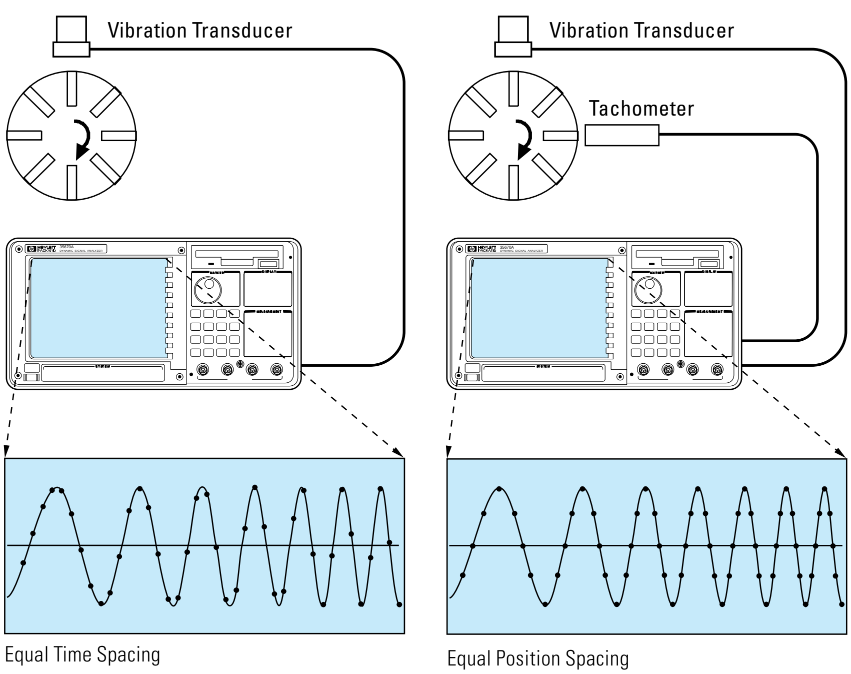
Frequency spectrum vs. order spectrum

The FFT process transforms time domain data to the frequency domain, creating a spectrum. Signals that are periodic (repetitive) in the time domain appear as peaks in the frequency domain. In order analysis the FFT transforms the revolution domain data into an order spectrum. Signals that are periodic in the revolution domain appear as peaks in the order domain. For example, if a vibration peak occurs twice every revolution at the same shaft position, a peak appears at the second order in the order spectrum.

What do order spectra look like? Figure 2 is an FFT spectrum map of an automobile engine run-up test from 665 to 3995 RPM. Figure 3 is an order spectrum map of the same measurement. The Y-axis in both maps is amplitude. The X-axis is frequency for the spectrum map and orders of rotation for the order map.

Figure 1:
Time Domain Samples
If samples are gathered at equal time intervals, the number of samples per cycle will vary.

Shaft Position Samples
Synchronizing samples to shaft position gives a constant number of points per cycle.



One obvious difference between the two maps is how the peaks line up. Each line of peaks on the order map clearly indicates a relationship between vibration and shaft position; the peaks in the spectrum map are difficult to relate to shaft speed. The maximum amplitude in the order map is at the 12th order and at 3815 RPM. This identifies the vibration in terms of engine speed, indicating a component is being excited 12 times per each engine revolution.

Order tracking
In Figure 3, the 12th order appears to be the most interesting, so you want to examine that order and to ignore the other orders. When you measure one order and exclude the others, the measurement is called an order track. Figure 4 shows this 12th order amplitude versus RPM for the engine run-up.

In the order track measurement, the relationship between the measured order vibration and the engine speed is clear. Order tracking helps you focus on exact components and to measure their contribution to the overall performance of a rotating machine.

Orders are essentially harmonics. But unlike harmonics, many interesting orders are noninteger multiples of the 1st order. A speed reducer has an output shaft order vibration at less than the first order. An automobile engine has order components that are higher ordered noninteger multiples. These may be gear mesh rates, timing chain engagement or valve action, for instance.

Applications
Order tracking and order analysis have become widely accepted rotating machinery measurements. Devices ranging from gear motors to gas turbines are tested this way. Even dental tools have been designed using order analysis. Some of the more unusual applications involve using order analysis to measure power line quality and for loudspeaker testing. These applications take advantage of the harmonic nature of the integer orders. ■

Frequency spectrum map of 6 cylinder engine run-up

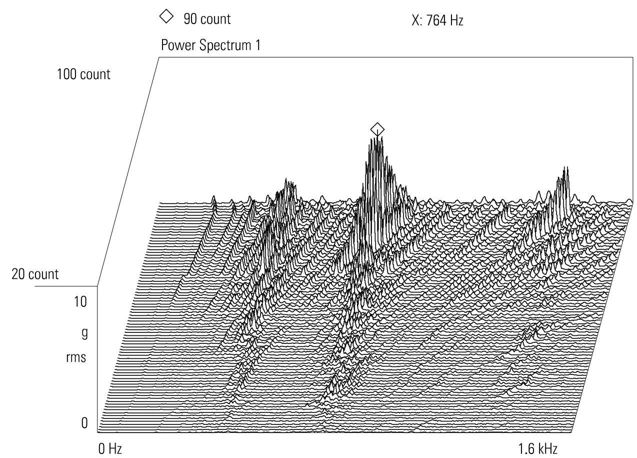


Figure 2: A frequency map reveals peaks but it is difficult to relate them to shaft speed.

Order spectrum map of 6 cylinder engine run-up

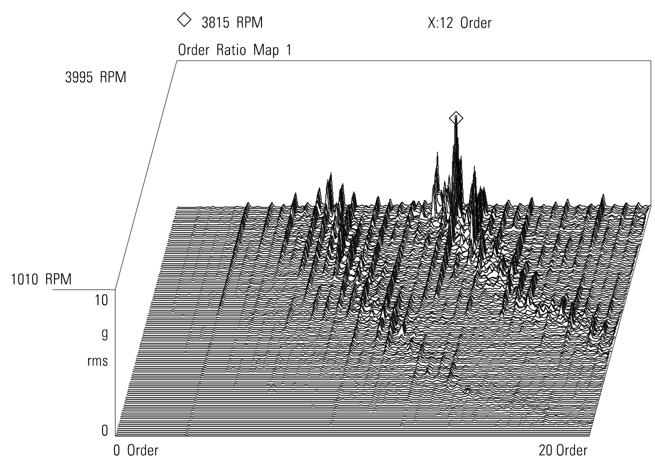


Figure 3: An order map clarifies the relationships between shaft speed and vibration amplitude.

Order track of 12th order, 6 cylinder engine run-up

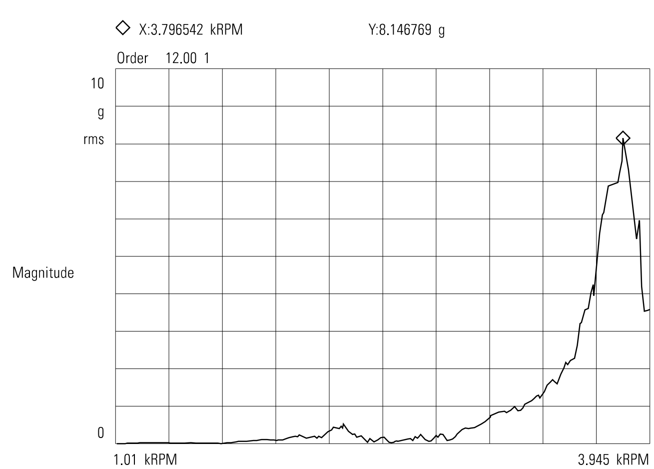
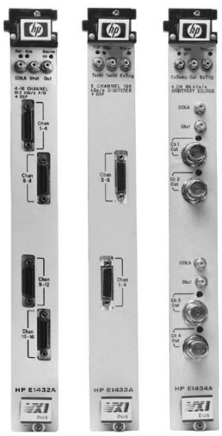


Figure 4: Order tracking clarifies the relationship of a particular shaft speed to amplitude vs. rpm.

What's New…

HP E1432A 16-Channel VXI Digitizer Module

The HP E1432A is HP's most economical digitizer for mechanical and acoustical applications. The combination of signal conditioning, filtering, digitizing and measurement computation in a single module not only reduces your hardware cost but simplifies software development, too. Five onboard processors offload the host computer by taking care of alias protection, FFTs, averaging and other tasks. Bandwidths range from 10 Hz to 23 kHz.



Circle 1 on the Reply Card.

HP E1433A 8-Channel VXI Digitizer Module

The HP E1433A offers HP's widest bandwidth and highest performance for digitizing mechanical, acoustical and electrical signals. The module samples at up to 196 kHz and provides alias-protected bandwidths from 0.4 Hz to 88 kHz. The HP E1433A relies on nine onboard processors to churn through data quickly, whether you're computing measurement results or capturing data directly to disk. Both the HP E1432A and E1433A offer an optional source output or tachometer/trigger input, and both modules are capable of transferring data to the HP E1562B Data Disk at 10 MBytes/second.

Circle 2 on the Reply Card.

HP E1434A Arbitrary Source Module

Add the unique test signals you need with the new HP E1434A Arbitrary Source for VXI systems. You'll have four outputs of 16-bit resolution (up to 25.6kHz) or two 20-bit outputs (up to 6.4 kHz.), an ideal configuration for modal analysis, acoustics and vibration control.

Circle 3 on the Reply Card.

New HP DSA Accessories Catalog

Find all the microphones, transducers and other gadgets you need for a complete measurement setup in the new edition of the HP DSA Accessories Catalog. It offers both HP's own products and a tested selection of high-quality items from other equipment manufactures.

Circle 4 on the Reply Card.

HP Source CD for VXI Products

This new CD-ROM contains the HP VXI catalog, an innovative system configuration tool and an evaluation copy of the HP VEE graphical programming language. And to give you a break from all that test system planning, we've even included an entertaining game.

Circle 5 on the Reply Card.

Find HP info online

Access HP, our comprehensive site on the Web, offers information on HP computing, communication and measurement solutions. The test and measurement section alone has more than 1,000 online data sheets to help you find the right instruments and system components.
(http://www.hp.com)

While you're on the Web, check out TechOnLine. This online mall features a variety of advanced-technology companies in such fields DSP, image processing, and electronic design automation.
(http://www.techonline.com)

New from HP Channel Partners

PAK MÜLLER-BBM

The Müller BBM PAK-Mobil portable VXI system (available in 4- and 6-slot versions) provides lab-quality measurements on the go for auto testing and other field applications.

Contact USA:
Al Prosuk, tel: 201-239-2858

m+p INTERNATIONAL

The world's first VXI-based vibration control system, the m+p VCX9000, is now available.

Contact (U.S.):
Guido Bossaert, tel: 201-239-3005
Contact (International):
Bernard Virnick, tel: 49 89 85 60 2284

LMS INTERNATIONAL

The LMS CADA-X products, Fourier Monitor and Signature Monitor are now available for VXI systems.

Contact:
LMS International, tel: 32 16 40 28 54

SDRC

The SDRC Test and Data Acquisition System (TDAS) now supports the HP E1432A 16-channel VXI module; the software now runs in the Windows PC environment.

Contact: SDRC, tel: 513-576-2400

Navcon Engineering Network
Noise & Vibration Consultants

NAVCON Engineering Seminars
Outdoor Noise Propagation, Measurement, Modeling & Evaluation (Feb 18-20, 1997); Modal Testing & Analysis (May 20-23, 1997); Acoustic Intensity Theory & Applications (Apr 22-24, 1997).

Contact:
NAVCON Engineering, tel: 714-441-3488

Creare

The Creare *Scanalyzer*™ provides real-time data acquisition, analysis and display using VXI hardware.

Contact: Creare, tel: 603-643-3800

Realtime Answers

Q: What is the easiest way to get report-quality graphs from data acquired with an HP DSA?

A: You can choose one of two commonly used methods: Plotting to a file or saving the measurement data and then using PC utilities to display it.

Plotting: All HP DSAs can produce a Hewlett-Packard Graphics Language (HP-GL) file of the display. The HP 35665A, 35670A, 3566A/3567A and 894XXA family can plot to a file. The portable products HP 3560A and 3569A can use the SDF Utility DOWNLOAD.EXE to plot to a PC's internal disk. When you are choosing your plot file name, add the .HGL suffix. This will allow most standard graphics or word processing packages to recognize the file as HP-GL.

PC utilities: Two HP utilities can create report quality graphics. Both work from stored measurement data, which means that you have actually saved the results of the measurement, not just a picture of the display. One of these tools, the SDF utility VIEWDATA.EXE, is included free with HP analyzers. The second is separate HP product, HP 35639A Data Viewer for Windows.

VIEWDATA.EXE is an MS-DOS based utility that can read and display multiple traces on your PC. You can configure the display interactively to show different representations of your Y-axis data. The program can provide output formatted as HP-GL or ASCII text, plus it can print to your local printer. For more information, refer to the SDF utilities manual that came with your HP DSA.

The HP 35639A Data Viewer for Windows package is a fast, flexible way to generate great-looking plots. (Many of the images you see in Realtime Update are created with this handy tool.) You can display data as one trace per screen or create custom pages with multiple traces. Customizing plots is simple; you just click on coordinates and enter different values. For instance, changing displayed results from peak to rms or log to linear takes only three mouse clicks.

The Data Viewer uses the Windows clipboard, so you embed your measurement displays as Windows Metafiles. In the Data Viewer, you simply select Edit, Copy Graphics, then switch to your favorite word processor or other package and select Paste to put the picture right where you want it. You can also paste data into spreadsheets for additional analysis.

REALTIME update

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